Effective Date: December 11, 2006
Expiration Date: December 11, 2011

Quality Manual

December 2006

Revision D

Verify that this is the correct version before use.

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

Quality Manual

Rev. D

Original signed by:

_____

Michael L. Coats, Center Director 12/11/2006

Change Record

Rev.	Date	Originator	Description
Basic	1/03	L. Dyer	JPG 5335.3 re-writes content originally contained in JPD 5335.1D and JSC SLP 4.2. Changes are not marked. JPD 5335.1E replaces JPD 5335.1D. JPG 5335.1 cancels JSC SLP 4.2.
Rev A	8/03	L. Dyer	Establish JSC Goals as quality objectives. Includes minor word changes.
Rev B	9/04	L. Dyer	Re-issue as a requirements document Add textual description of the JSC Goals
Rev C	3/06	L. Dyer	Rescind SLP 4.3 and 4.20; Align QMS objectives, JSC Goals and management reviews; Add Procedures interactions; and Add content to accommodate AS9100 requirements.
Rev D	10/06	L. Dyer	Revise Appendix B, Process Interactions to include the communication of key characteristics throughout a product life-cycle

P.1 PURPOSE

Document the scope, objectives, procedures, interactions, and functional requirements of the Johnson Space Center (JSC) Quality Management System (QMS).

P.2 APPLICABILITY

The QMS is applicable to products and services provided by the Lyndon B. Johnson Space Center for program and project management, spacecraft engineering and design, flight crew training, space and life sciences research, and mission operations in support of the human exploration and development of space enterprise.

The QMS applies to JSC suppliers and partners to the extent specified by their contracts or agreeements, respectively.

All JSC organizations are Affected Organizations for this JPR.

P.3 AUTHORITY

JPD 5335.1, *Quality Policy*

P.4 REFERENCES

JPR 1107.1, *JSC Organization*

JPR 7120.3, *Project Management: Systems Engineering & Project Control Processes and Requirements*

ANSI/ISO/ASQ Q9001-2000, December 13, 2000

SAE AS9100, *Quality System-Aerospace Model for Quality Assurance in Design, Development, Production, Installation, and Servicing*

P.5 CANCELLATION

JSC SLP 4.3, Customer Focus content included in JSC SLP 4.9, Process Control

JSC SLP 4.8, Product Identification & Traceability content included in JSC SLP 4.10, Inspection & Testing

JSC SLP 4.12, Inspection and Test Status content included in JSC SLP 4.10, Inspection and Testing

JSC SLP 4.20, Process Measurement and Improvement process measurement content included in JSC SLP 4.9, Process Control, and continual improvement content included in JSC SLP 4.14, Corrective and Preventive Action

1 QMS SCOPE

The scope of the QMS includes all products and services provided by JSC that support human operations in space.

2 QMS OBJECTIVES

QMS objectives are the goals established by JSC to measure, report, and improve Centerwide operations. Goals are an expression of JSC commitment to safety, mission, technical and management excellence, and outreach, and are set by senior management.

Goal 1: Succeed - Successfully support and execute current programs.

Goal 2: Advance - Produce, enhance and sustain the technology, knowledge, facilities, and skills to enable exploration.

Goal 3: Manage - Enable current and future work through excellence in management.

Goal 4: Contribute - Demonstrate the benefits of space exploration.

A hierarchy of measurements and metrics is used to characterize the performance for each Goal. Characterizations are reported as Center director metrics, and are the basis for conducting Centerwide management reviews.

3 DOCUMENTED PROCEDURES

Documented requirements and procedures are used to control the quality of JSC products and services. Centerwide requirements and procedures for management, resources, product realization, and improvement are documented as System Level Procedures (SLP). Each SLP has an Office of Primary Responsibility (OPR) responsible for configuration control. The OPR coordinates technical content, which is usually comprised of input from multiple disciplines, manages reviews and revisions, and maintains alignment with applicable Standards. SLPs are listed as Appendix A.

4 PROCEDURE INTERACTIONS

QMS requirements and procedures span the life cycle of product and service realization, from customer requirements through retirement. The relationship between life cycle and QMS procedures is shown as Appendix B, which uses the communication of key characteristics throughout a product life-cycle to describe the interaction between procedures and processes.

5 PROCESS INTERACTIONS

A Common Work Instruction (CWI) is used to control processes or other specialized material of a continuing nature for Centerwide application. The interaction between QMS function and common processes and material is shown as Appendix C.

A Unique Work Instruction (UWI) is used to control specialized processes that are product or service specific. Web-based Organization Master Lists identify UWI and

provide access to the current electronic version, or identity of the applicable hardcopy version to be used.

NASA Procedure Requirements, NASA Standards, and Forms are referenced, as appropriate, by identification within an SLP, CWI, or UWI. External documents, also identified on Organization Master Lists, are included in the QMS only to the extent referenced.

6 FUNCTIONAL REQUIREMENTS

The products and services provided by JSC implement the NASA Strategic Plan and the NASA Performance Plan. The Strategic Plan establishes agency missions, goals, and objectives. The NASA Performance Plan, part of the budget process, establishes annual agency outcomes and performance targets. NASA Mission Directorates and Resident Program Offices fund JSC directorates to provide products and services, and perform projects and investigations. Requirements flow-down and quality management is shown as Section 8.

The Center director establishes organizations and structure. JPR 1107.1 documents the JSC organization, including functional statements, delegations of authority, and lines of succession. Organizational Web sites communicate local structure and functional activities.

Senior Management sets quality objectives, reviews the QMS to ensure its continuing effectiveness, and assesses opportunities for improvement and the need for change. In addition they:

a) Ensure that the planning of the Centerwide management system is carried out to meet the objectives and requirements; that its integrity is maintained when change occurs, whether planned or unplanned; and that responsibilities and authorities are defined and communicated within the organization.

b) Demonstrate commitment to the operation and improvement of the Centerwide management system by ensuring the availability of resources, and communicating to the organization the importance of meeting customer as well as statutory and regulatory requirements.

Supervisors and staff implement the QMS by ensuring that:

a) Customer requirements are determined, communications are maintained, and satisfaction is measured;

b) Products and services are planned—including objectives, developed under controlled conditions, measured, reviewed, and improved;

c) Processes and their interactions used to provide products and services are defined, planned, measured, reviewed, and improved;

d) Each defined process has a person or office responsible for its control and operation;

e) Employee Performance Plans derive from the NASA Strategic Plan;

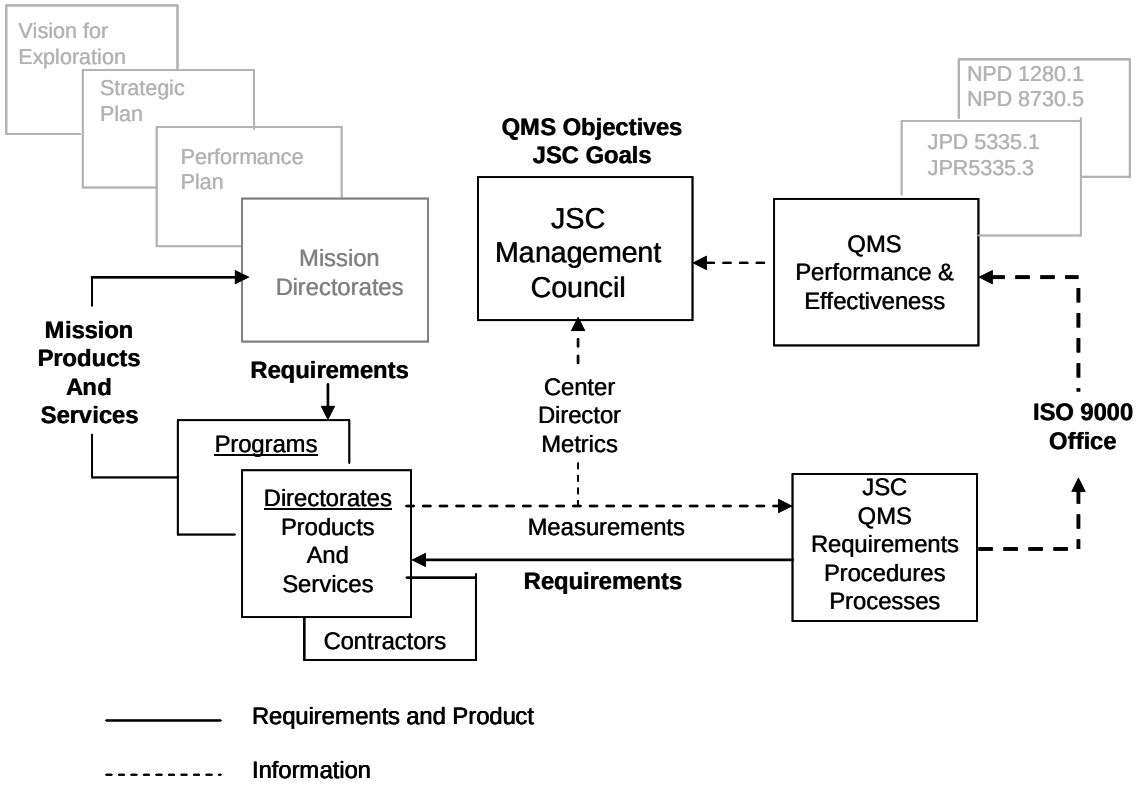
f) Contracts and agreements include requirements for QMS; and

g) Contract administration includes surveillance commensurate with risk.

7 CERTIFICATIONS

Certifications maintain the quality of the QMS. The JSC QMS is certified compliant with the ISO 9001-2000 Standard and the SAE AS9100, as determined by a third-party registrar. Requirements of the standard are met by dcoumented procedures identified as Appendix A, procedure interrelationships with product and service life cycle shown as Appendix B, and processes interactions shown as Appendix C. The correspondence between requirements of the standards and QMS content is as provided as Appendix D.

8 REQUIREMENTS FLOW-DOWN



APPENDIX A. SYSTEM-LEVEL DOCUMENTATION

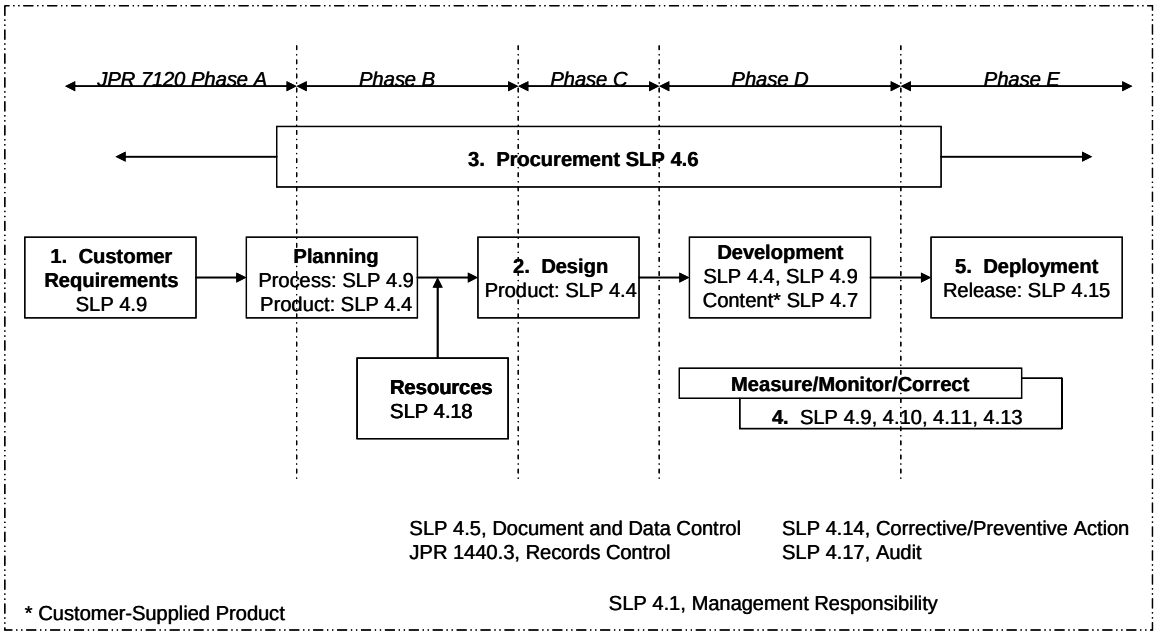
Management System	Responsibility
JPD 5335.1, Quality Policy JPR 5335.3, Quality Manual	ISO 9000 Office

Core Functions	Responsibility
JSC SLP 4.1, Management Responsibility	ISO 9000 Office
JSC SLP 4.5-1, Document and Data Control JSC SLP 4.5-3, Preparation of CWI	Information Resources Directorate
JPR 1440.3, JSC Files and Records Management Procedure	Information Resources Directorate
JSC SLP 4.6, Procurement	Office of Procurement
JSC SLP 4.14, Corrective and Preventive Action	ISO 9000 Office
JSC SLP 4.17, Internal Audit	ISO 9000 Office
JSC SLP 4.18, Resource Management	Human Resources Office

Product/Service Realization	Responsibility
JSC SLP 4.4, Design and Development	Engineering Directorate
JSC SLP 4.7, Control of Customer-Supplied Product	Center Operations Directorate, Logistics
JSC SLP 4.9, Process Control	Office of the Chief Engineer
JSC SLP 4.10, Inspection and Testing	Safety & Mission Assurance Directorate
JSC SLP 4.11, Control of Monitoring and Measurement Devices	Engineering Directorate
JSC SLP 4.13, Control of Nonconforming Product	Safety & Mission Assurance Directorate
JSC SLP 4.15, Identification, Handling, Storage, Packaging, Preservation and Delivery	Center Operations Directorate, Logistics

APPENDIX B. PROCEDURE INTERACTIONS

The communication of physical and functional key characteristics throughout a product life-cycle (numbered 1 thru 5 in the diagram below) is a good example of how QMS processes interact. Physical key characteristics are the features of a material, process, or part whose variation has a significant influence on product fit, performance, service life, or manufacturability. Functional key characteristic are the features of a system, subsystem, or assembly whose attributes are more suitably verified through analysis and/or test.



1. A customer is more likely to define functional rather than physical key characteristics. The project manager shall clearly call out all customer-defined key characteristics in an appropriate project agreement document (e.g., Project Technical Requirements Specification, Project Requirements Document, System Requirements Document, Certification and Requirements Document, etc.).

2. The design function specifies physical key characteristics on the drawing, by placing mandatory inspection point (MIP) symbol on the drawing near the characteristic in accordance with JPR 8500.4. For controlled hardware, the design function develops test procedures to verify the product. There are two categories of tests: Acceptance (workmanship screening) and Qualification/Certification. The design function also performs a Failure Mode and Effects Analysis and a Hazard Analysis to identify controls for preventing failures and eliminating or mitigating hazards. The results are inserted into the work authorizing documents (e.g., Task Performance Sheet) or procedures (e.g., Detailed Process Instruction)

to designate those steps or step sequences considered to be so significant that they must be verified to have been properly completed before work/test can proceed.

3. For parts that are designed and fabricated by an off-site vendor, the vendor shall use the key characteristics (MIP) identified on the drawings provided. Special instructions to the vendor regarding the verification, if appropriate, are transmitted on JSC Form JF 2422, which is incorporated into the procurement documents.

4. Key characteristics are transmitted to the fabrication function via the drawing, traveling documents, and associated inspection plans developed by the production planner. Quality Engineering reviews them and in conjunction with the design function, may identify additional key characteristics that would be added to drawings or traveling documents, as appropriate. Similarly, Quality Engineering may elect to re-verify MIP for off-site fabricated parts, when they are not verified as a higher assembly utilizing those parts.

5. Quality Engineering verifies adherence to key characteristics for all on-site and off-site fabricated parts prior to release for delivery.

APPENDIX C. PROCESS INTERACTIONS

Core Functions	Common Processes
Management Responsibility	LA-CWI-01, Budget Planning Process
Document and Data Control	JSC 27678, Organizational Master List Instructions JPR 1410.2, JSC Directives System Procedural Requirements JPR 1450.1, JSC Supplement to NPG 1450.10C, NASA Correspondence Management & Communications Standards & Style JPR 1450.5, Incoming Mail Handling, Suspense Control, and Special Handling of White House, Congressional and Foreign National Correspondence JPD 2314.2, Identifying and Processing JSC Scientific, Technical and Administrative Documents
Resource Management	J49W-03, How to Request Personnel Reliability Program Certification
Procurement	
Purchase Card Program	http://officeofprocurement.jsc.nasa.gov/cc/index.htm
Contractor Surveillance	http://officeofprocurement.jsc.nasa.gov/survplans.htm
Audit	AG-UWI-003, Conducting and Participating in Internal Audits JE17W-01, Conducting and Participating in EMS Audits
Institutional Operations	
Emergency Operations	JSC 05900, Emergency Preparedness Plan J7-W-02, EO Deficiency Tracking System J7-W-05, Employee Notification of Emergency Events J7-W-08, Emergency Preparedness Emergency Handoff Procedure
Energy Conservation	J69W-03, Energy Conservation
Export Control	J29W-01, Export Control http://www4.jsc.nasa.gov/org/ja/export/ExportHelp.htm
Property Control	JB15W-20, Management of Controlled Equipment JB9W-12, Personal Property/Equipment Instructions for Excess and Disposal
Security	J29W-02, Foreign National Badge Requests J7-W-06, Community Partner Badge Printing Process JPR 2810.1, Information Technology Security Handbook

Product/Service Realization Functions	**Common Processes**
Requirements	JPR 5335.2, Space Act Agreements LA-CWI-02, Agreements J69W-04, Construction of Facilities Budget Development AG-UWI-001, Lessons Learned Process JPR 7120.3, Project Management: Systems Engineering and Projects Control Processes and Requirements JSC 26549, Control of Program Stock
Design and Development	JPR 7120.3, Project Management: Systems Engineering and Projects Control Processes and Requirements JPR 8500.4, Engineering Drawing System Manual J59W04, Facilities Project Construction Handbook JSC 49861, IRD Project Life Cycle Guidelines
Calibration	ES-CWI-6.32, IM&TE User Instructions for MSCL Calibration ES-CWI-6.33, IM&TE User Calibration Instructions
Non-Conforming Product	NT-CWI-001, Task Performance Sheet NT-CWI-003, Quality Assurance Record Center Discrepancy Reporting and Tracking
Monitoring and Measurement	NT-CWI-002, Product Verification Plan

APPENDIX D. COMPLIANCE MAP

JSC QMS Document	ISO 9001-2000 & AS9100 Requirements
JPD 5335.1	5.3, 5.5.2
JPR 5335.3	4.1, 4.2.1, 4.2.2, 5.1, 5.4, 5.5.1, 5.5.3
SLP 4.1	5.1, 5.6, 8.2.1, 8.4
SLP 4.4	4.3, 7.1 (product), 7.3.2, 7.3.3, 7.3.4, 7.3.5, 7.3.6, 7.3.6.1, 7.3.6.2 (except 7.3.6.2.b), 7.3.7, 8.2.4.2
SLP 4.5-1 and SLP 4.5-3	4.2.1, 4.2.3
SLP 4.6	7.4.1, 7.4.2
SLP 4.7	7.5.4
SLP 4.9	3, 5.2, 6.3, 6.4, 7.1 (process), 7.2, 7.3.6.2.b, 7.5.1, 7.5.2, 8.1, 8.2.3, 8.4
SLP 4.10	7.4.3, 7.5.3, 8.2.4, 8.2.4.1
SLP 4.11	7.6
SLP 4.13	8.3
SLP 4.14	8.5
SLP 4.15	7.5.5
SLP 4.17	8.2.2
SLP 4.18	6.1, 6.2
JPR 1440.3	4.2.4